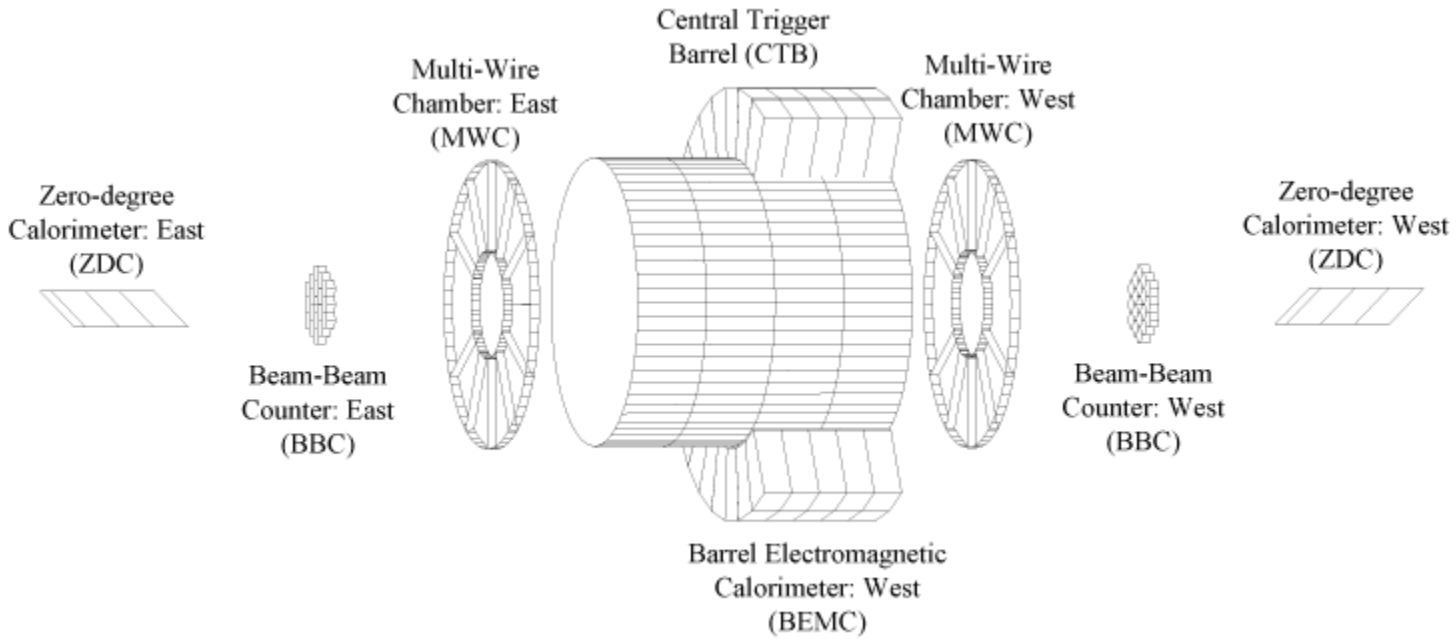
Level 0 Trigger - 2003

- REQUIREMENTS
  - Look at every RHIC bunch crossing
  - Save raw trigger data for Levels 1, 2 and DAQ
  - Perform simple analysis to extract global quantities (centrality, vertex location…)
  - Prescale and issue triggers based on that analysis and the status of STAR

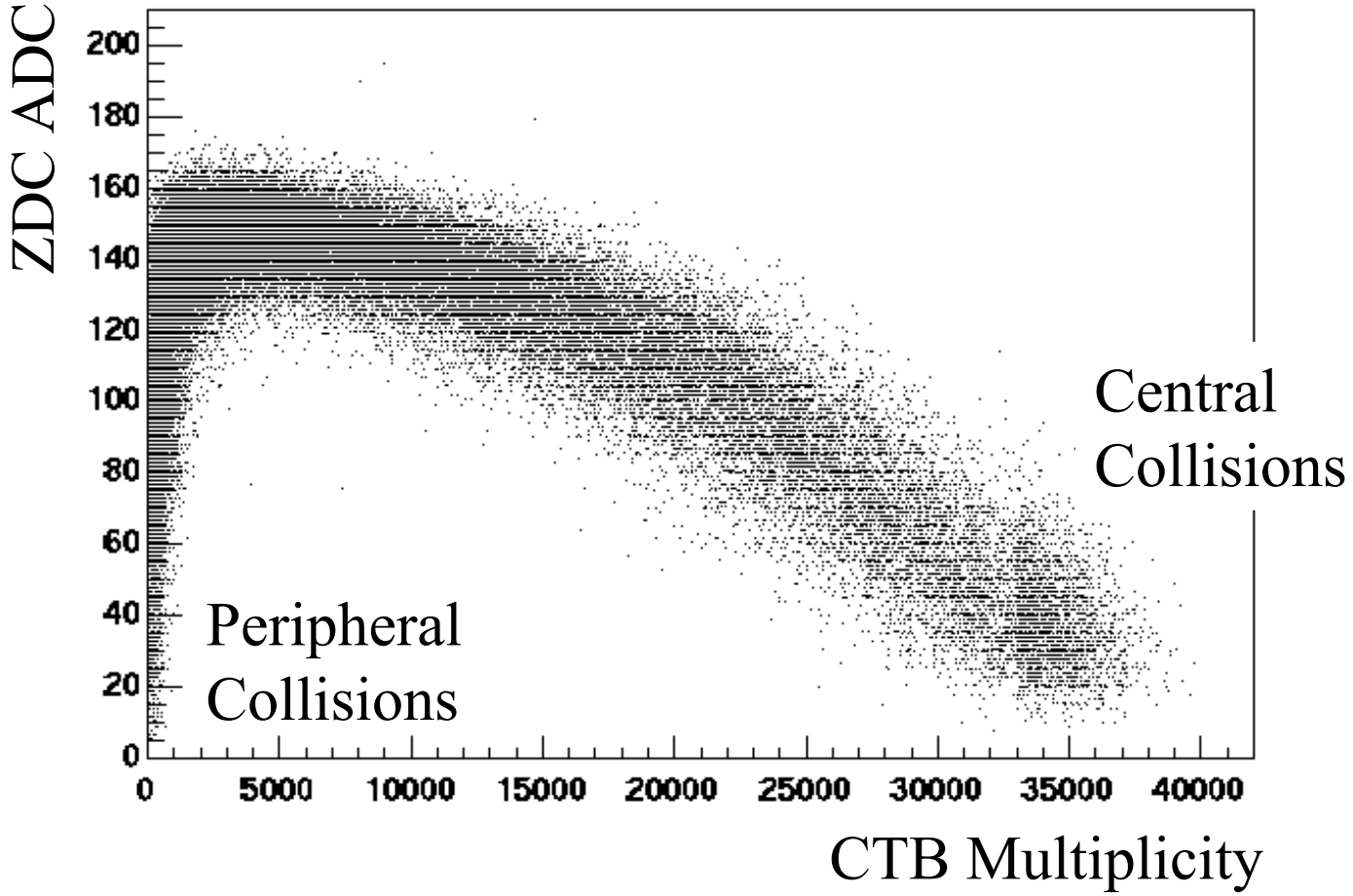
Trigger Detectors



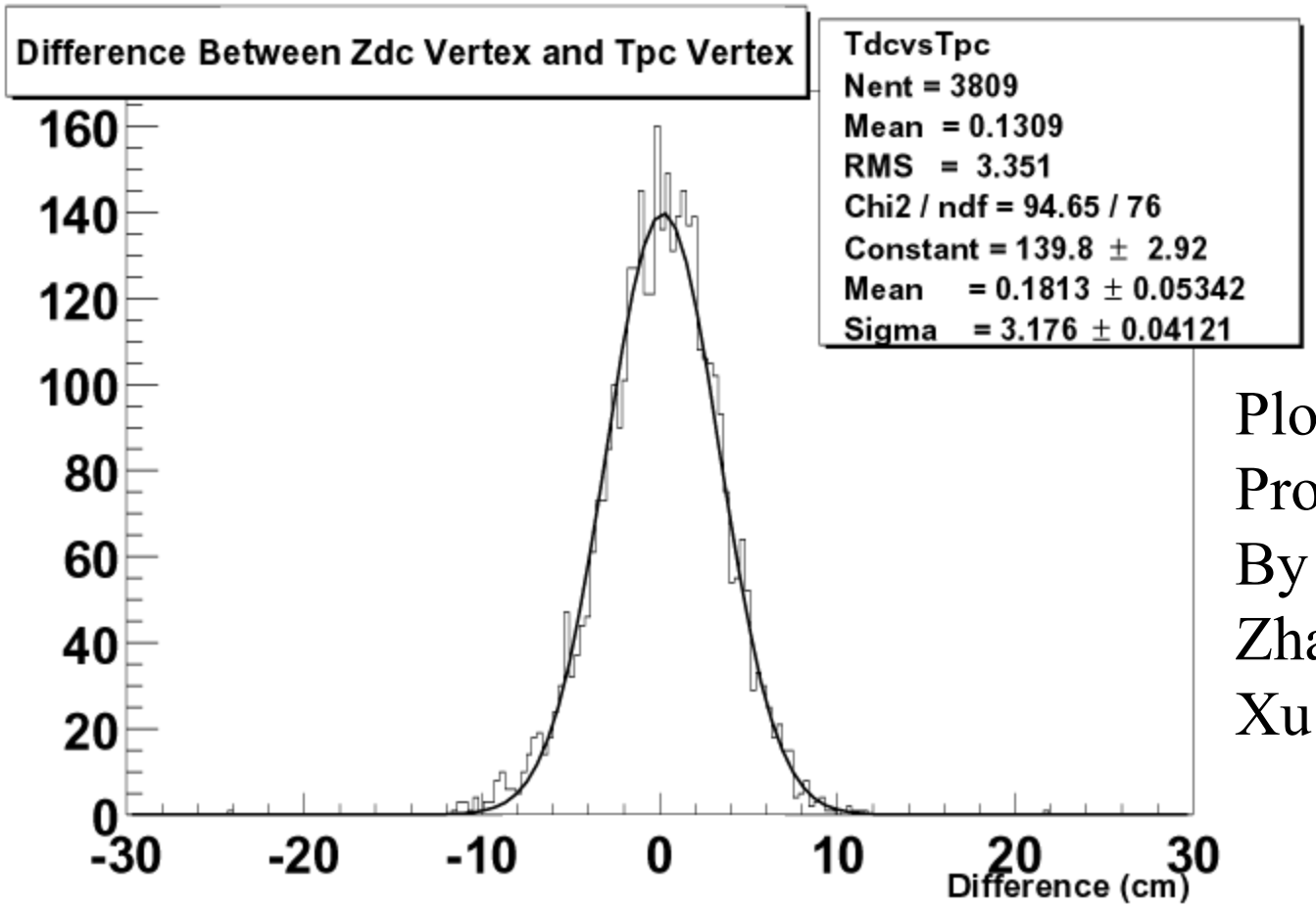
Existing Trigger Detector Measurements

- CTB
  - Charged particle multiplicity at mid-rapidity
  - Used as a measure of centrality
- ZDC
  - Spectator neutrons at zero-degrees
  - ADC value used as a measure of centrality in combination with the CTB
  - TAC difference used to locate the primary vertex

CTB-ZDC Relationship



ZDC vs TPC Vertices



Plot Provided By Zhangbu Xu

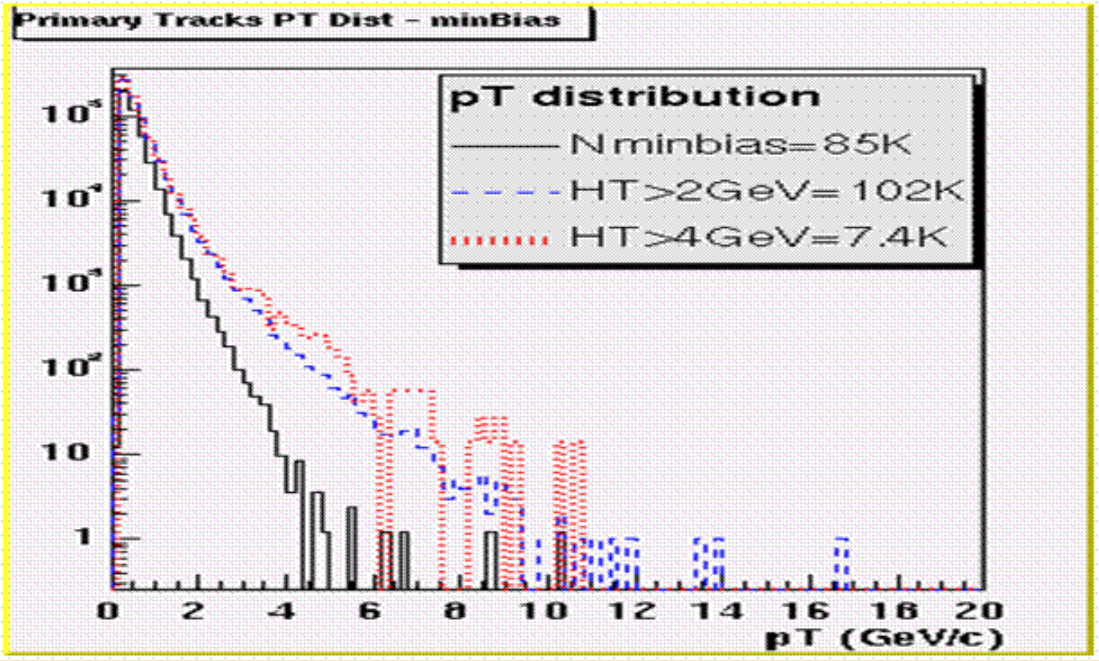
New Trigger Detector Measurements

- BBC
  - Charged particle multiplicity at beam rapidity
  - TAC difference used to locate the primary vertex in the same was as the ZDC
  - BBC will also work in pp interactions
- BEMC/EEMC
  - High-pt particles at mid-rapidity
  - Used to detect jets, J/Ψ, etc…

BEMC-Triggered Pt Distribution

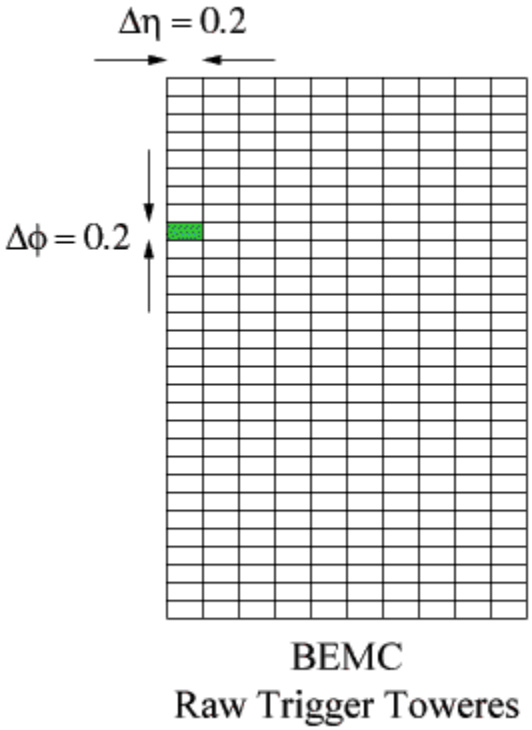
Enhancement of High pT Tracks

~50x for pT >2.0 GeV/c

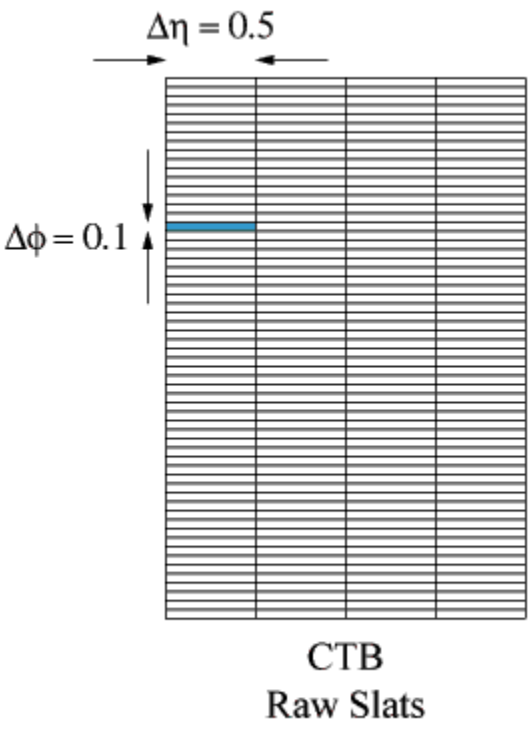


Mirko Planinic (IUCF)

BEMC & CTB – Raw Data



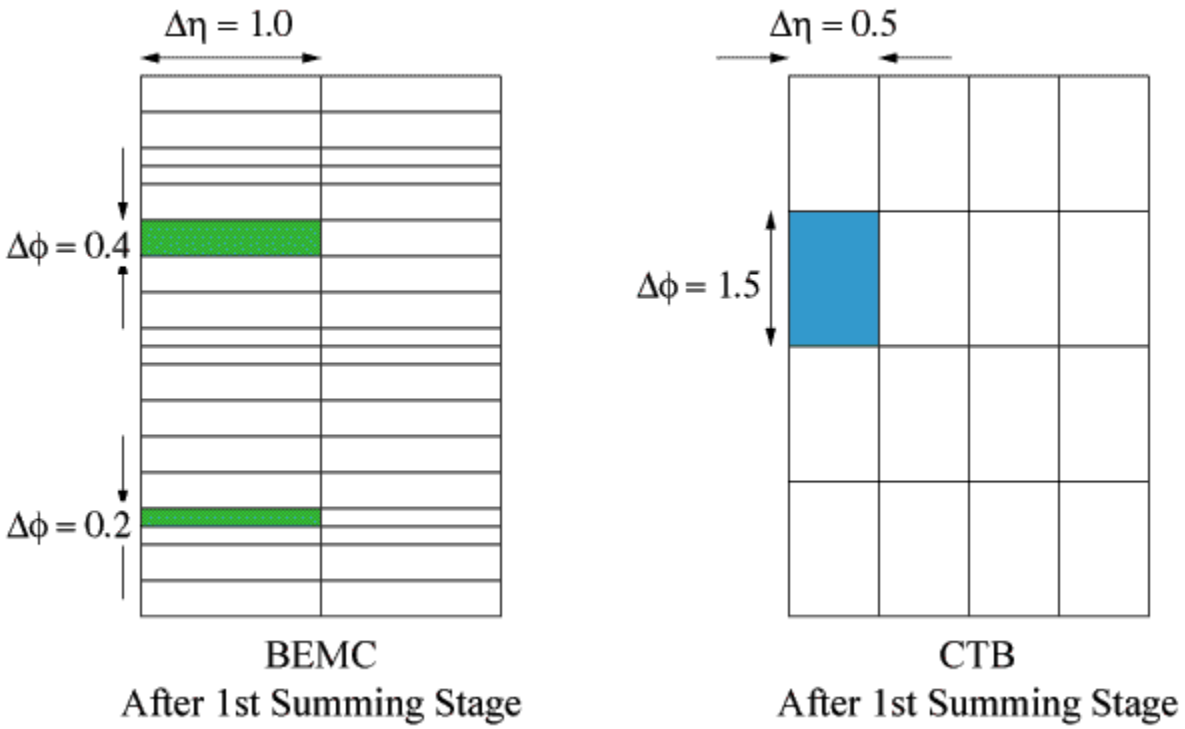
BEMC
Raw Trigger Toweres



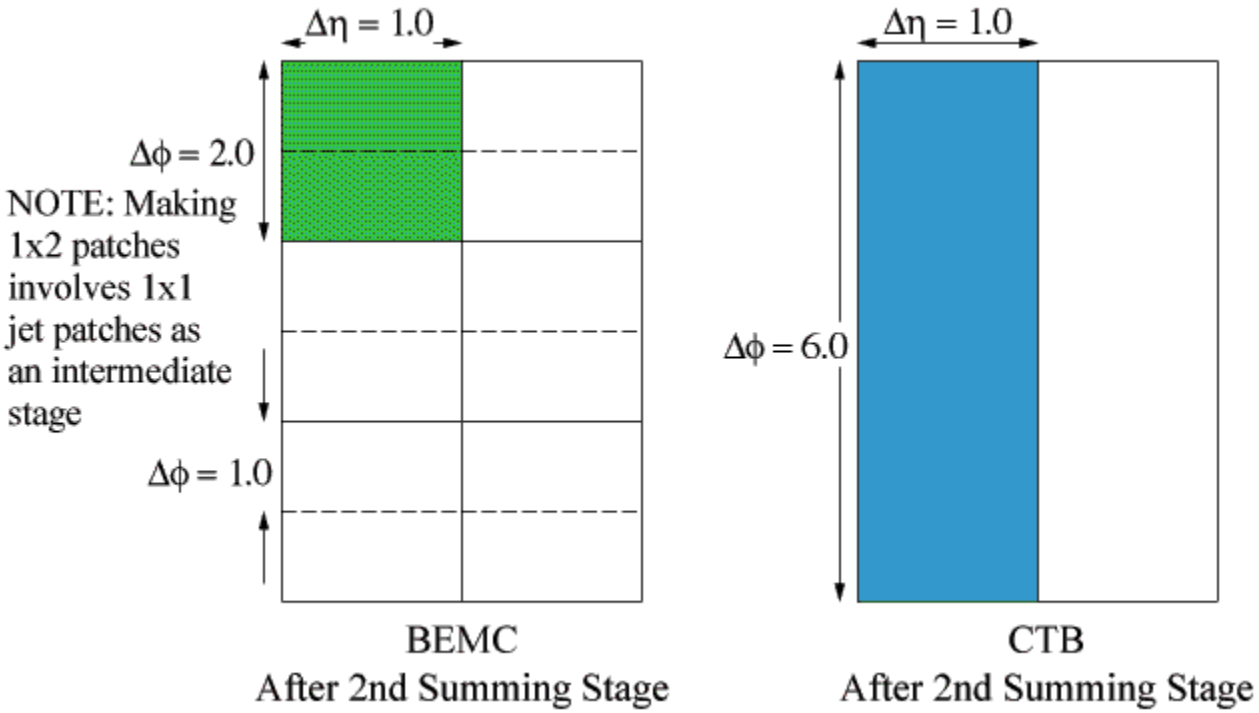
CTB
Raw Slats

Question:
Can these different raw pixels be summed in a way that allows a direct comparison at Level 0 and still meet their individual physics goals?

BEMC & CTB – Results of First Sums



BEMC & CTB Sums – Results of Second Sums



Answer: No

BEMC summing optimized to create 1x1 jet patches.

CTB summing optimized to maintain η granularity

Example Triggers

- Hadronic Minimum Bias
  - At least 1 neutron in each ZDC and TAC difference in acceptable range
  - At least 15 MIPs (75 ADC counts) in CTB
- Hadronic Central
  - At least 1 neutron in each ZDC and TAC difference in acceptable range
  - At least 2000 MIPs (10000 ADC counts) in CTB
  - ZDC E+W < 85 ADC counts (50% of maximum)

Questions for 2003

- How do we want to define "Central" and "Minimum Bias" for the next run?
- How exactly do we plan to use the new detectors?
  - BBC
  - BEMC
  - EEMC
- Can we answer these questions before the run begins?